

09/555350

526 Rec'd PCT/PTO

26 MAY 2000

VERIFICATION OF TRANSLATION

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confirm that I am fully conversant with the German and English languages and I state that the following is a true translation of the best of my knowledge and belief.

- Sequence listing as amended and filed with the European Patent Office on April 22, 1999 - for:
U.S. application, based on:
International Patent Application No. PCT/DE98/03543 filed on November 27, 1998

entitled "CELL-SPECIFIC RETROVIRAL VECTORS WITH ANTIBODY DOMAINS AND METHOD FOR THE PRODUCTION THEREOF FOR SELECTIVE GENE TRANSFER"

Applicant: *Bundesrepublik Deutschland, letztvertreten durch den Präsidenten des Paul-Ehrlich-Instituts*

Dated: May 25, 2000

Signature:

Sabine Riemann

Our Reference: 158-2US

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SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT:

- (A) NAME: Federal Republic of Germany, finally represented by
the President of the Paul-Ehrlich-Institute
(B) STREET: Paul-Ehrlich-Str. 51-59
(C) CITY: Langen
(E) COUNTRY: Germany
(F) POSTAL CODE (ZIP): 63225

(ii) TITLE OF INVENTION: CELL-SPECIFIC RETROVIRAL VECTORS WITH
ANTIBODY DOMAINS AND METHOD FOR THE PRODUCTION THEREOF FOR SELECTIVE GENE
TRANSFER

(iii) NUMBER OF SEQUENCES: 31

(iv) COMPUTER-READABLE FORM:

- (A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.30 (EPA)

(v) PRIOR APPLICATION DATA:

APPLICATION NUMBER: DE 197 52 854.6
DATE OF APPLICATION: 28-11-1997

(2) INFORMATION FOR SEQ ID NO: 1:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 4776 Base pairs
(B) TYPE: Nucleotide
(C) STRANDEDNESS: double
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: other nucleic acid

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

GAATTC	CCCGT	ACGAGC	CATA	GATAAA	AATAA	AAGATT	TTTAT	TTAGT	CTCCA	GAAAA	AGGGG	60
GGAAT	GAAAG	ACCCAC	CCTG	TAGGTT	TGGC	AAGCT	AGCTT	AAGTA	ACGCC	ATTTT	GC AAG	120
GCATG	GAAAA	ATACAT	AACT	GAGAAT	AGAG	AAGTTC	AGAT	CAAGG	TCAGG	AACAG	ATGGA	180
ACAGC	TGAAT	ATGGG	CCAAA	CAGGAT	ATCT	GTGGT	AAGCA	GTTCC	TGCCC	CGGCT	CAGGG	240
CCAAG	AACAG	ATGGA	ACAGC	TGAAT	ATGGG	CCAAAC	AGGA	TATCT	GTGGT	AAGCA	GTTC	300
TGCCC	CGGCT	CAGGG	CCAAG	AACAG	ATGGT	CCCCA	GATGC	GGTCC	AGCCC	TCAGC	AGTTT	360
CTAGA	GAACC	ATCAG	ATGTT	TCCAG	GGTGC	CCCAAG	GACC	TGAAA	TGACC	CTGTG	CCCTTA	420
TTTGA	ACTAA	CCAAT	CAGTT	CGCTT	CTCGC	TTCTG	TTCGC	GCGCT	TCTGC	TCCCC	GAGCT	480
CAATA	AAAAG	GCCCAC	AACC	CCTCA	CTCGG	GGCGC	CAGTC	CTCCG	ATTGA	CTGAG	TCGCC	540
CGGCT	G GGGG	AGCTC	GCTGT	TGGGCT	CGCG	GTTG	AGGACA	AACTC	TTTCG	GGTCT	TTTCCA	600

GTACTCTTGG ATCGGAAACC CGTCGGCCTC CGAACGGTAC TCCGCCACCG AGGGACCTGA 660
GCGAGTCCGC ATCGACCGGA TCGGAAACC TCTCGAGAAA GGCGTCTAAC CAGTCACAGT 720
CGCAAGGTAG GCTGAGCACC GTGGCCGGGC GGCACGGGTG GCGGTCGGGG TTGTTTCTGG 780
CGGAGGTGCT GCTGATGATG TAATTAAGTA GGCGGTCTTG AGACGGCGAT GGTGAGGTG 840
AGGTGTGGCA GGCTTGAGAT CTGGCCATAC ACTTGAGTGA CAATGACATC CACTTTGCCT 900
TTCTCTCCAC AGGTGTCCAC TCCCAGGTCC AACC GGATCC GAGCTCCACC GCGGTAAAGG 960
TCGCTGGGAA GACCCCGTGG ATCCACCACT CTCGACTCAA GAAAGCTCCT GACAACCAAG 1020
AAGAATGGAC TGTCTACCA ACCTCCGATC CGCTGAGGGT AAAGTTGACC AGGCGAGCAA 1080
AATCCTAATT CTCCTTGTGG CTTGGTGGGG GTTTGGGACC ACTGCCGAAG TTTGACTGTC 1140
CGGCTCCGGG GCGGGTGGTT CTGGTGGTGG TTCTGGTGGT GGTGGTTCTG GTGGTGGTGG 1200
TTCTGGCGCC AGCCCAGTCC AGTTTATCCC CCTGCTTGTG GGTCTAGGGA TTTCAGGGGC 1260
TACACTTGCT GGTGGAACGG GGCTTGGGGT CTCGGTTCAC ACTTATCACA AGCTCTCTAA 1320
TCAATTGATT GAAGATGTCC AGGCTCTTTC AGGGACCATC AATGACCTAC AGGACCAGAT 1380
TGACTCCCTG GCTGAGGTTG TCTTACAAA TAGAAGAGGG TTAGACCTAT TGACTGCCGA 1440
ACAAGGAGGA ATATGTCTCG CACTCCAGGA GAAGTGTGT TTTTACGCTA ACAAGTCGGG 1500
TATCGTACGT GACAAGATCC GAAACTCCA AGAGGACCTT ATCGAGAGAA AACGTGCACT 1560
GTACGACAAC CCCCTGTGGA GCGGCTTGAA CGGCTTCCTT CCATATTTGC TACCCTTGTT 1620
AGGCCCCCTG TTTGGGCTCA TATTGTTCTT GACCCTCGGC CCGTGCATTA TGAAGACCCT 1680
GACTCGCATT ATACATGACA AAATTCAGGC AGTAAATCC TAGCACTAGT CCCACAGTAC 1740
AAGCCACTCC CAACAGAGAT GGATACCCTA GGGGTCCGAT GGTCTAAGAA TTCTCGAGTC 1800
TAAGATCGAT CGAATTCCTA GGTCAATGAT TTGACCAGAA TGTACAAGAG CAGTGGGGAA 1860
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ACATTGATGA GTTTGGACAA ACCACAATA GAATGCAGTG AAAAAATGC TTTATTTGTG 1980
AAATTTGTGA TGCTATTGCT TTATTTGTAA CCATTATAAG CTGCAATAAA CAAGTTAACA 2040
ACAACAATTG CATTCATTTT ATGTTTCAGG TTCAGGGGGA GGTGTGGGAG GTTTTTTAAA 2100
GCAAGTAAAA CCTCTACAAA TCAAGCTGGG CAAGCTAGAT CTAGCTTGGC GTAATCATGG 2160
TCATAGCTGT TTCCTGTGTG AAATGTGTAT CCGCTCACAA TTCCACACAA CATACGAGCC 2220
GGAAGCATAA AGTGTAAGC CTGGGGTGCC TAATGAGTGA GCTAACTCAC ATTAATTGCG 2280
TTGCGCTCAC TGCCCGCTTT CCAGTCGGGA AACCTGTCGT GCCAGCTGCA TTAATGAATC 2340
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GACTCGCTGC GCTCGGTGCT TCGGCTGCGG CGAGCGGTAT CAGCTCACTC AAAGGCGGTA 2460
ATACGGTTAT CCACAGAATC AGGGGATAAC GCAGGAAAGA ACATGTGAGC AAAAGGCCAG 2520
CAAAAGGCCA GGAACCGTAA AAAGGCCGCG TTGCTGGCGT TTTTCCATAG GCTCCGCCCC 2580

CCTGACGAGC ATCACAAAAA TCGACGCTCA AGTCAGAGGT GGCGAAACCC GACAGGACTA	2640
TAAAGATACC AGGCGTTTCC CCCTGGAAGC TCCCTCGTGC GCTCTCCTGT TCCGACCCTG	2700
CCGCTTACCG GATACCTGTC CGCCTTTCTC CTTTCGGGAA GCGTGGCGCT TTCTCAATGC	2760
TCACGCTGTA GGTATCTCAG TTCGGTGTAG GTCGTTTCGCT CCAAGCTGGG CTGTGTGCAC	2820
GAACCCCCCG TTCAGCCCGA CCGCTGCGCC TTATCCGGTA ACTATCGTCT TGAGTCCAAC	2880
CCGGTAAGAC ACGACTTATC GCCACTGGCA GCAGCCACTG GTAACAGGAT TAGCAGAGCG	2940
AGGTATGTAG GCGGTGCTAC AGAGTTCTTG AAGTGGTGGC CTAACACGG CTACACTAGA	3000
AGGACAGTAT TTGGTATCTG CGCTCTGCTG AAGCCAGTTA CCTTCGGAAA AAGAGTTGGT	3060
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GACGCTCAGT GGAACGAAAA CTCACGTAA GGGATTTTGG TCATGAGATT ATCAAAAAGG	3240
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GAGTAACTT GGTCTGACAG TTACCAATGC TTAATCAGTG AGGCACCTAT CTCAGCGATC	3360
TGCTCTATTC GTTCATCCAT AGTTGCCTGA CTCCCCGTCG TGTAGATAAC TACGATACGG	3420
GAGGGCTTAC CATCTGGCCC CAGTGCTGCA ATGATACCGC GAGACCCACG CTCACCGGCT	3480
CCAGATTTAT CAGCAATAAA CCAGCCAGCC GGAAGGGCCG AGCGCAGAAG TGGTCCTGCA	3540
ACTTTATCCG CCTCCATCCA GTCTATTAAT TGTTGCCGGG AAGCTAGAGT AAGTAGTTCG	3600
CCAGTTAATA GTTTGCGCAA CGTTGTTGCC ATTGCTACAG GCATCGTGGT GTCACGCTCG	3660
TCGTTTGGA TGGCTTCATT CAGCTCCGGT TCCCAACGAT CAAGGCGAGT TACATGATCC	3720
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TTGGCCGCGAG TGTTATCACT CATGGTTATG GCAGCACTGC ATAATTCTCT TACTGTCTATG	3840
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TGTATGCGGC GACCGAGTTG CTCTTGCCCC GCGTCAATAC GGGATAATAC CGCGCCACAT	3960
AGCAGAACTT TAAAAGTGCT CATCATTGGA AAACGTTCTT CGGGGCGAAA ACTCTCAAGG	4020
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GCATCTTTTA CTTTCACCAG CGTTTCTGGG TGAGCAAAAA CAGGAAGGCA AAATGCCGCA	4140
AAAAAGGGAA TAAGGGCGAC ACGGAAATGT TGAATACTCA TACTCTTCCT TTTTCAATAT	4200
TATTGAAGCA TTTATCAGGG TTATTGTCTC ATGAGCGGAT ACATATTTGA ATGTATTTAG	4260
AAAAATAAAC AAATAGGGGT TCCGCGCACA TTTCCCCGAA AAGTGCCACC TGACGTCTAA	4320
GAAACCATTA TTATCATGAC ATTAACCTAT AAAAATAGGC GTATCACGAG GCCCTTTCGT	4380
CTCGCGCGTT TCGGTGATGA CGGTGAAAAC CTCTGACACA TGCAGCTCCC GGAGACGGTC	4440
ACAGCTTGTC TGTAAGCGGA TGCCGGGAGC AGACAAGCCC GTCAGGGCGC GTCAGCGGGT	4500

GTGGCGGGT	GTGGGGCTG	GCTTAACAT	GCGGCATCAG	AGCAGATTGT	ACTGAGAGTG	4560
CACCATATGC	GGTGTGAAAT	ACCGCACAGA	TGCGTAAGGA	GAAATACCG	CATCAGGCGC	4620
CATTGCGCAT	TCAGGCTGCG	CAACTGTTGG	GAAGGGCGAT	CGGTGCGGGC	CTCTTCGCTA	4680
TTACGCCAGC	TGGCGAAAGG	GGGATGTGCT	GCAAGGCGAT	TAAGTTGGGT	AACGCCAGGG	4740
TTTCCCAGT	CACGACGTTG	TAAACGACG	GCCAGT			4776

(2) INFORMATION FOR SEQ ID NO: 2:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 12 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

Met Lys Asp Pro Thr Cys Arg Phe Gly Lys Leu Ala
5 10

(2) INFORMATION FOR SEQ ID NO: 3:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 21 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 3:

Met Glu Lys Tyr Ile Thr Glu Asn Arg Glu Val Gln Ile Lys Val Arg
5 10 15

Asn Arg Trp Asn Ser
20

(2) INFORMATION FOR SEQ ID NO: 4:

- (1) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 8 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (*1) SEQUENCE DESCRIPTION: SEQ ID NO: 4:

Met Gly Gln Thr Gly Tyr Leu Trp
5

(2) INFORMATION FOR SEQ ID NO: 5:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 13 Amino acids
(B) TYPE: Amino acid
(D) TOPOLOGY: linear
(ii) MOLECULE TYPE: Protein
(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 5:

Met Glu Gln Leu Asn Met Gly Gln Thr Gly Tyr Leu Trp
5 10

(2) INFORMATION FOR SEQ ID NO: 6:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 12 Amino acids
(B) TYPE: Amino acid
(D) TOPOLOGY: linear
(ii) MOLECULE TYPE: Protein
(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 6:

5

Met Val Pro Arg Cys Gly Pro Ala Leu Ser Ser Phe
5 10

(2) INFORMATION FOR SEQ ID NO: 7:

(1) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 7:

Met Phe Pro Gly Cys Pro Lys Asp Leu Lys
5 10

(2) INFORMATION FOR SEQ ID NO: 8:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 15 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(11) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 8:

Met Val Glu Val Arg Cys Gly Arg Leu Glu Ile Trp Pro Tyr Thr
5 10 15

(2) INFORMATION FOR SEQ ID NO: 9:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 9:

Met Thr Ser Thr Leu Pro Phe Ser Pro Gln Val Ser Thr Pro Arg Ser
5 10 15
Asn Arg Ile Arg Ala Pro Pro Arg
20

(2) INFORMATION FOR SEQ ID NO: 10:

(1) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 232 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 10:

Met	Asp	Cys	Leu	Thr	Asn	Leu	Arg	Ser	Ala	Glu	Gly	Lys	Val	Asp	Gln
				5					10					15	
Ala	Ser	Lys	Ile	Leu	Ile	Leu	Leu	Val	Ala	Trp	Trp	Gly	Phe	Gly	Thr
			20					25					30		
Thr	Ala	Glu	Val	Ser	Thr	Ala	Gly	Ser	Gly	Gly	Gly	Gly	Ser	Gly	Gly
		35					40					45			
Gly	Ser	Gly	Gly	Gly	Gly	Ser	Gly	Gly	Gly	Gly	Ser	Gly	Ala	Ser	Pro
		50				55					60				
Val	Gln	Phe	Ile	Pro	Leu	Leu	Val	Gly	Leu	Gly	Ile	Ser	Gly	Ala	Thr
65					70					75					80
Leu	Ala	Gly	Gly	Thr	Gly	Leu	Gly	Val	Ser	Val	His	Thr	Tyr	His	Lys
				85					90					95	
Leu	Ser	Asn	Gln	Leu	Ile	Glu	Asp	Val	Gln	Ala	Leu	Ser	Gly	Thr	Ile
			100					105					110		
Asn	Asp	Leu	Gln	Asp	Gln	Ile	Asp	Ser	Leu	Ala	Glu	Val	Val	Leu	Gln
		115					120					125			
Asn	Arg	Arg	Gly	Leu	Asp	Leu	Leu	Thr	Ala	Glu	Gln	Gly	Gly	Ile	Cys
130					135					140					
Leu	Ala	Leu	Gln	Glu	Lys	Cys	Cys	Phe	Tyr	Ala	Asn	Lys	Ser	Gly	Ile
145					150					155					160
Val	Arg	Asp	Lys	Ile	Arg	Lys	Leu	Gln	Glu	Asp	Leu	Ile	Glu	Arg	Lys

6

				165					170					175					
Arg	Ala	Leu	Tyr	Asp	Asn	Pro	Leu	Trp	Ser	Gly	Leu	Asn	Gly	Phe	Leu				
			180					185					190						
Pro	Tyr	Leu	Leu	Pro	Leu	Leu	Gly	Pro	Leu	Phe	Gly	Leu	Ile	Leu	Phe				
		195					200					205							
Leu	Thr	Leu	Gly	Pro	Cys	Ile	Met	Lys	Thr	Leu	Thr	Arg	Ile	Ile	His				
	210					215					220								
Asp	Lys	Ile	Gln	Ala	Val	Lys	Ser												
225					230														

(2) INFORMATION FOR SEQ ID NO: 11:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 14 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 11:

Met	Asp	Thr	Leu	Gly	Val	Arg	Trp	Ser	Lys	Asn	Ser	Arg	Val
			5										10

(2) INFORMATION FOR SEQ ID NO: 12:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 15 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 12:

Met	Tyr	Lys	Ser	Ser	Gly	Glu	Cys	Gly	Arg	Gly	Leu	Arg	Arg	Pro
			5											15

(2) INFORMATION FOR SEQ ID NO: 13:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 16 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 13:

Met	Ile	Arg	Tyr	Ile	Asp	Glu	Phe	Gly	Gln	Thr	Thr	Thr	Arg	Met	Gln
			5												15

(2) INFORMATION FOR SEQ ID NO: 14:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 4 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 14:

Met Leu Tyr Leu

(2) INFORMATION FOR SEQ ID NO: 15:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 6 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 15:

Met Leu Leu Leu Tyr Leu

(2) INFORMATION FOR SEQ ID NO: 16:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 12 Amino acids

(B) TYPE: Amino acid

7

(D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 16:
 Met Phe Gln Val Gln Gly Glu Val Trp Glu Val Phe
 5 10

(2) INFORMATION FOR SEQ ID NO: 17:
 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 26 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 17:

Met Val Ile Ala Val Ser Cys Val Lys Leu Leu Ser Ala His Asn Ser
 5 10 15
 Thr Gln His Thr Ser Arg Lys His Lys Val
 20 25

(2) INFORMATION FOR SEQ ID NO: 18:
 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 49 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 18:

Met Ser Glu Leu Thr His Ile Asn Cys Val Ala Leu Thr Ala Arg Phe
 5 10 15
 Pro Val Gly Lys Pro Val Val Pro Ala Leu Met Asn Arg Pro Thr
 20 25 30
 Arg Gly Glu Arg Arg Phe Ala Tyr Trp Ala Leu Phe Arg Phe Leu Ala
 35 40 45
 His

(2) INFORMATION FOR SEQ ID NO: 19:
 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 4 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 19:

Met Leu Thr Leu

(2) INFORMATION FOR SEQ ID NO: 20:
 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 20:
 Met Arg Leu Ser Lys Arg Ile Phe Thr
 5

(2) INFORMATION FOR SEQ ID NO: 21:
 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 11 Amino acids
 (B) TYPE: Amino acid
 (D) TOPOLOGY: linear
 (ii) MOLECULE TYPE: Protein
 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 21:
 Met Ser Lys Leu Gly Leu Thr Val Thr Asn Ala
 5 10

(2) INFORMATION FOR SEQ ID NO: 22:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 70 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 22:

```

Met Arg Cys Glu Ile Pro His Arg Cys Val Arg Arg Lys Tyr Arg Ile
      5              10              15
Arg Arg His Ser Pro Phe Arg Leu Arg Asn Cys Trp Glu Gly Arg Ser
      20              25              30
Val Arg Ala Ser Ser Leu Leu Arg Gln Leu Ala Lys Gly Gly Cys Ala
      35              40              45
Ala Arg Arg Leu Ser Trp Val Thr Pro Gly Phe Ser Gln Ser Arg Arg
      50              55              60
Cys Lys Thr Thr Ala Ser
      65              70

```

(2) INFORMATION FOR SEQ ID NO: 23:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 88 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 23:

```

Met Ile Pro Arg Asp Pro Arg Ser Pro Ala Pro Asp Leu Ser Ala Ile
      5              10              15
Asn Gln Pro Ala Gly Arg Ala Glu Arg Ser Gly Pro Ala Thr Leu
      20              25              30
Ser Ala Ser Ile Gln Ser Ile Asn Cys Cys Arg Glu Ala Arg Val Ser
      35              40              45
Ser Ser Pro Val Asn Ser Leu Arg Asn Val Val Ala Ile Ala Thr Gly
      50              55              60
Ile Val Val Ser Arg Ser Ser Phe Gly Met Ala Ser Phe Ser Ser Gly
      65              70              75              80
Ser Gln Arg Ser Arg Arg Val Thr
      85

```

(2) INFORMATION FOR SEQ ID NO: 24:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 56 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 24:

```

Met Leu Cys Lys Lys Ala Val Ser Ser Phe Gly Pro Pro Ile Val Val
      5              10              15
Arg Ser Lys Leu Ala Ala Val Leu Ser Leu Met Val Met Ala Ala Leu
      20              25              30
His Asn Ser Leu Thr Val Met Pro Ser Val Arg Cys Phe Ser Val Thr
      35              40              45
Gly Glu Tyr Ser Thr Lys Ser Phe
      50              55

```

(2) INFORMATION FOR SEQ ID NO: 25:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 49 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

[illegible]

Met Pro Gln Lys Arg Glu
5

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 27;

Met Leu Asn Thr His Thr Leu Pro Phe Ser Ile Leu Leu Lys His Leu
5
Ser Gly Leu Leu Ser His Glu Arg Ile His Ile
10
20 25 15

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 28:

Met Tyr Leu Glu Lys
5

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 29;

Met Thr Leu Thr Tyr Lys Asn Arg Arg Ile Thr Arg Pro Phe Arg Leu
5 10
Ala Arg Phe Gly Asp Asp Gly Glu Asn Leu
20 25 15

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 30:

10

Met Gln Leu Pro Glu Thr Val Thr Ala Cys Leu
5 10

(2) INFORMATION FOR SEQ ID NO: 31:

(1) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 31 Amino acids

(B) TYPE: Amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: Protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 31:

Met Pro Gly Ala Asp Lys Pro Val Arg Ala Arg Gln Arg Val Leu Ala
 Gly Val Gly Ala Gly Leu Thr Met Arg His Gln Ser Arg Leu Tyr